

## CLAIMS

What is claimed is:

1. An axle shaft assembly for a motor vehicle comprising:
  - a bearing unit;
  - an axle shaft rotatably supported by the wheel bearing unit, the axle shaft having an outer diameter; and
  - a bearing retainer mounted on the axle shaft and abutting the wheel bearing unit, the bearing retainer having a piloting feature for aligning the bearing retainer with respect to a rotational axis of the axle shaft, the piloting feature including a pilot surface with an inner diameter approximately equal to the outer diameter of the axle shaft.
2. The axle shaft assembly of claim 1, wherein the inner diameter is about .0035 inch to about .0064 inch larger than the outer diameter of the axle shaft.
3. The axle shaft assembly of claim 1, wherein the bearing retainer includes a shoulder formed thereon, the shoulder engages the wheel bearing unit and applies a preload to the wheel bearing unit.

4. The axle shaft assembly of claim 1, wherein the bearing retainer includes a chamfered edge extending from the pilot surface to an end of the bearing retainer.

5. The axle shaft assembly of claim 1, wherein the bearing retainer includes a plurality of drive flanks formed thereon.

6. The axle shaft assembly of claim 1, wherein the axle shaft includes a thread portion and the bearing retainer includes a thread portion matched to the thread portion of the axle shaft.

7. The axle shaft assembly of claim 6, wherein the thread portion is less restrictive than a class 6H thread.

8. The axle shaft assembly of claim 1, further comprising an anti-lock braking sensor mounted to a tubular sheath surrounding the axle shaft, the anti-lock braking sensor capable of detecting the rotational speed of the axle shaft.

9. The axle shaft assembly of claim 8, wherein the bearing retainer includes a tone wheel with plurality of teeth extending radially outward and detectable by the anti-lock braking sensor.

10. The axle shaft assembly of claim 1, further including a snap ring mounted to the axle shaft for securing the bearing retainer to the axle shaft.

11. A bearing retainer adapted to be mounted on an axle shaft in a motor vehicle, the bearing retainer comprising:

a nut portion defining a bore with a thread formed within the bore adapted to engage a thread formed on the axle shaft, the thread having a locking feature adapted to lock the bearing retainer to the axle shaft;

a tone wheel portion extending around the nut portion and including a plurality of teeth extending radially out from the nut portion; and

a piloting feature formed within the bore and including a pilot surface adapted to align the bearing retainer to the axle shaft and a chamfer edge for assisting in aligning the bearing retainer to the axle shaft.

12. An axle shaft assembly for a motor vehicle comprising:  
an axle shaft having an outer diameter with a piloting feature  
formed thereon;  
a bearing unit for rotatably supporting the axle shaft;  
a bearing retainer threadably coupled to the axle shaft; and  
a rotating component of a wheel speed sensor, the rotating  
component being located between the bearing retainer and the bearing unit, the  
rotating component including a complementary piloting feature that cooperates  
with the piloting features on the axle shaft to align the rotating component to a  
rotational axis of the axle shaft;  
wherein at least one of the piloting feature and complementary  
piloting feature is tapered about at least a portion of its circumference.

13. The axle shaft assembly of claim 12, wherein one of the piloting feature is at least partially tapered and the complementary piloting feature includes a cylindrical bore that is sized to at least partially receive the tapered portion of the piloting feature.

14. The axle shaft assembly of claim 12, wherein the piloting feature further includes a cylindrical stem and wherein the cylindrical bore at least partially receives the cylindrical stem.

15. The axle shaft assembly of claim 14, wherein a nominal size of the cylindrical stem is sized less than about 0.01 inch smaller than a nominal size of the cylindrical bore.

16. The axle shaft assembly of claim 15, wherein the nominal size of the stem is less than about 0.005 inch smaller than the nominal size of the cylindrical bore.

17. The axle shaft assembly of claim 12, wherein the rotating component and the bearing retainer are unitarily formed.

18. The axle shaft assembly of claim 17, wherein a plurality of teeth extend radially outwardly from a body of the rotating component.

19. The axle shaft assembly of claim 18, wherein an abutting shoulder is formed on the rotating component, the abutting shoulder contacting the bearing unit at a predetermined location so as to axially space the teeth apart from the bearing unit.

20. An axle shaft assembly for a motor vehicle, comprising:  
an axle shaft; and  
a wheel speed sensor having a rotating component and a  
stationary component, the rotating component being configured to rotate with the  
axle shaft, the rotating component having a pilot feature formed thereon for  
aligning the rotating component with the axle shaft.

21. An axle shaft assembly for a motor vehicle, comprising:

an axle shaft having an outer diameter and a retainer threadably coupled to the axle shaft; and

a rotating component of a wheel speed sensor, the rotating component in juxtaposed relation with the axle shaft and the retainer, the rotating component receiving therethrough the axle shaft and including a corresponding piloting feature that cooperates with the outer diameter of the axle shaft to align the rotating component with the axle shaft.